Book Reviews

Themes in Embryology

A History of Embryology. T. J. HORDER, J. A. WITKOWSKI, and C. C. WYLIE, Eds. Cambridge University Press, New York, 1986. xxiv, 477 pp., illus. $99.50. British Society for Developmental Biology Symposium 8 (Nottingham, April 1983).

As Joseph Needham notes in the preface to this volume and the editors mention in their introduction, the only surveys of embryology are Needham's classic *History of Embryology* (1934), which covered developments until the early 19th century, and several subsequent historical studies, all of which stop at the end of the 19th century. It is unfortunate, therefore, that *A History of Embryology* is not the work that completes the historical treatment of the field by synthesizing the 20th-century developments. Instead, the volume, which emerged in revised form from a symposium of the British Society for Developmental Biology, is a collection of 15 idiosyncratic papers clustered loosely about two chronological themes, classical experimental embryology from 1880 to 1940 and post-war developments in embryology. The six papers in the first section are primarily historical in focus, whereas the nine in the second section "abandon any attempt at historical sequence" and address contemporary issues.

There are some notable successes in the volume. Frederick Churchill's paper on August Weismann is first-rate. Churchill masterfully argues that Weismann's germ-plasm theory not only was remarkable for challenging inheritance of acquired characters, it also led Weismann to view heredity as the source of variation, an idea not shared by many of his colleagues but critical for later Mendelian theories of inheritance. Jane Maienschein details the American reaction to the work of Wilhelm Roux and Hans Driesch, especially in terms of the debate over preformation versus epigenesis. Her paper is also important because it touches upon the unique cell-lineage work pioneered in the United States by the students of W. K. Brooks and C. O. Whitman. In a collaborative study, T. J. Horder and P. J. Weindling resurrect the life and work of Hans Spemann, a figure often mentioned but rarely discussed in detail. In their treatment of Spemann and his idea of the "organizer" they self-consciously separate the study into an "internal" approach, dealing with Spemann the scientist, and an "external" approach, dealing with Spemann the man. Unfortunately, this distinction, no longer an overt issue among historians, creates more of a distraction than the authors intend. Robert Olby shows the importance of instrumentation in 20th-century molecular approaches to embryology. His argument deserves close attention because of its emphasis on the role of tools and techniques in scientific discovery. In a too-brief paper, Eric Davidson illustrates how many of the current ideas of genomic activity can be traced to the suggestive experimental work of Theodor Boveri. Davidson's brevity here can be forgiven, however, as his *Gene Activity in Early Development* (second edition) remains the most satisfying treatment of the historical development of ideas relating the role of the cytoplasm and the nuclear material in embryological events.

The editors scored another series of successes in the valuable chronological outline of important events in the history of embryology, the outline of major background concepts in generation and heredity to the end of the 19th century, and the excellent segues for the historical papers in the first section of the volume. The volume concludes with an extensive section of selected references to resources in the history of embryology. Though most of the material is familiar to historians of science, the section should be an invaluable resource for scientists with an interest in deepening their historical appreciation of embryology.

But a number of problems plague the volume. Many of the deficiencies may be those inherent in a compilation, but many others could have been avoided by more careful editing and, perhaps, the addition of a professional historian to the editorial staff. Most shocking are the number of grammatical errors, misspellings, and typographical mistakes. In addition, several of the papers are diffuse: Garland Allen's work on T. H. Morgan bogs down in semantic wrangling over mechanistic materialism, dichotomies in biology, and economic and social modeling applied to the scientific community; J. A. Witkowski's interesting study of Harrison is fragmented by needless subdivisions; and Neil Tennant's potentially exciting discussion of reductionism and holism loses the reader by using too much jargon familiar only to professional philosophers. Finally, the editors should have cautioned the scientists contributing to the volume not to write studies that were essentially literature reviews. Several chapters lack any interpretation of the science; this is a lack that may limit the audience of the volume. Nevertheless, the volume will serve as an important contribution to and foundation for the awaited history of 20th-century embryology.

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Human Genetic Diversity

Genetic Variation and Its Maintenance. With Particular Reference to Tropical Populations. D. F. ROBERTS and G. F. DE STEFANO, Eds. Cambridge University Press, New York, 1986. xii, 286 pp., illus. $39.50. Society for the Study of Human Biology Symposium 27 (Rome, April 1985).

This volume contains a selection of the papers presented at a symposium sponsored by the International Union of Biological Sciences. The first section is composed of eight papers, starting with an overview by Roberts entitled "Genetic polymorphisms—a widening panorama." He notes the astonishing rate of increase in the number of polymorphisms, beginning with the discovery of ABO blood groups at the turn of the century. Several graphs highlight the accelerating growth in number of biochemical markers as new techniques appeared. Other papers describe HLA variation, chromosome polymorphism, restriction fragment length polymorphisms (RFLPs), and variation in mitochondrial DNA. In the early days the data were biased in favor of polymorphic loci, since these were the ones most easily studied. Better methods increased the number of detectable alleles at some loci, but added more data on less variable loci so that the estimates of average heterozygosity were reduced. The study of RFLPs shows greater variability, since the whole genome—much of it without known function—rather than just the translated part is sampled. The results largely duplicate those found in other species. My main criticism of this section of the book is that the authors do not appear to have taken into account the ascertainment bias involved in estimating polymorphism and heterozygosity from RFLP data. This bias arises from the fact that cleavage sites are about twice as likely to be discovered in a polymorphic sequence as in a monomorphic one (Ewens *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **78**, 3748 [1981]; Engels, *ibid.*, 6329 [1981]; Hudson, *Genetics* **100**, 711 [1982]); hence, the amount of variability is overestimated.

A second group of nine papers gives more attention to possible mechanisms. The critical role of malaria is emphasized. Hemoglobin S (Hb S) exists in three distinct, geographically separated haplotypes in central and western Africa, suggesting three independent origins. The very low frequency of Hb S in southern Africa argues that these populations migrated southward before malaria was the scourge that it became in more recent times. Not only do sickle cell trait, thalassemia, and glucose-6-phosphate dehydrogenase play a role in malaria resistance,